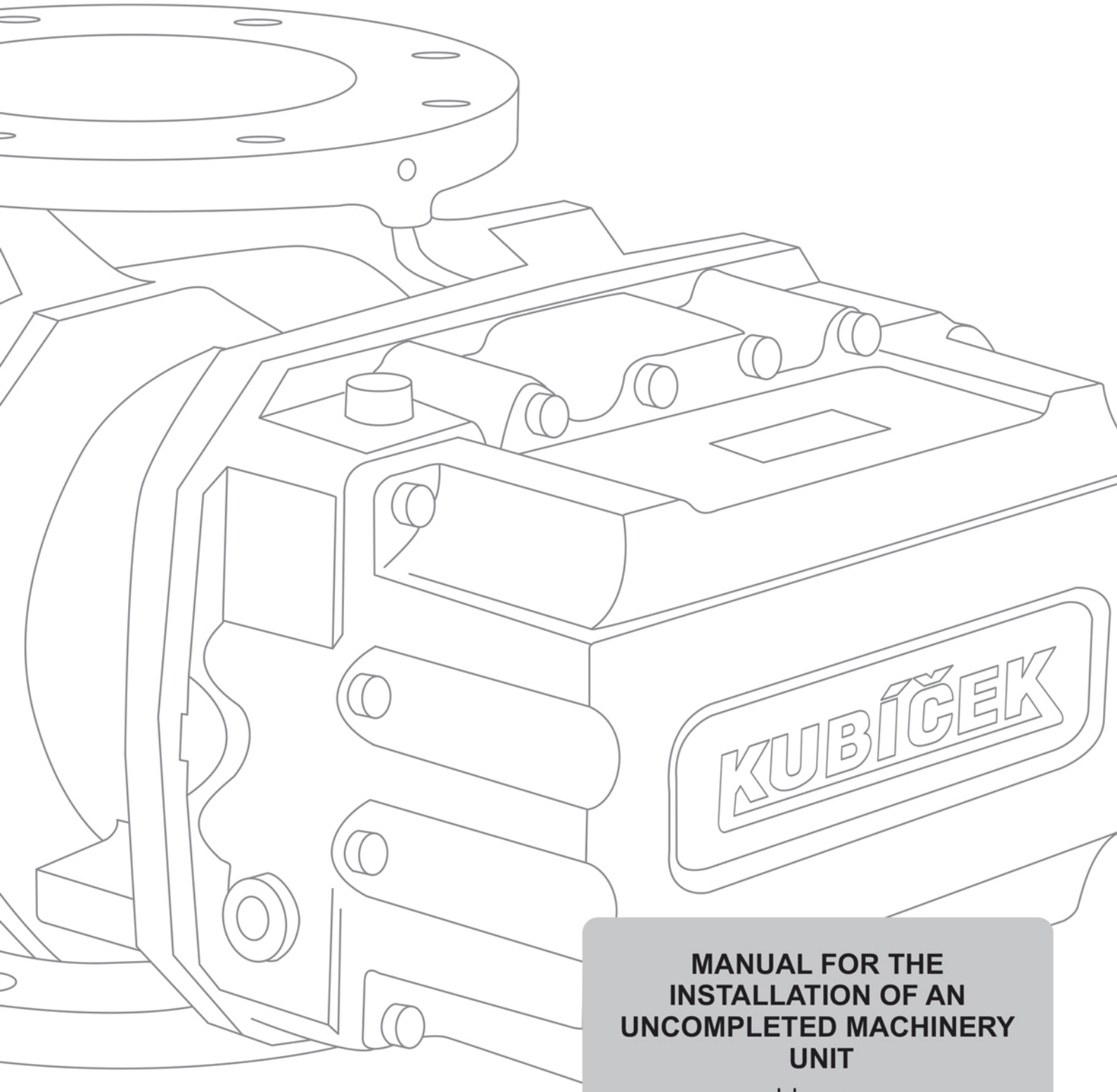
This direction for installation of an uncompleted machinery unit includes important instructions and safety warnings.

Please read this direction carefully before using the blower unit.

KUBÍČEK

**DMYCHADLA**
**ROOTS BLOWERS**




# MANUAL FOR THE INSTALLATION OF AN UNCOMPLETED MACHINERY UNIT

blower

Translation of the original direction for use

Subject to change without notice

**www.kubicekvhs.cz**

2012/10

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# 1 INTRODUCTION

## 1.1 GENERAL

This manual will provide you with a thorough acquaintance with an uncompleted machine (a blower) and ensure its safe and trouble-free installation and operation.

Compliance with this manual during the entire service life of this blower will ensure that during the installation and the subsequent use of the blower the safety rules will be observed at a level that corresponds to the currently applicable safety standards and regulations and correct technical practice.

This manual is not intended to deal with either the hazards or the risks resulting from the improper installation or utilisation of the blower for unintended purposes, nor any hazards and risks that might arise from specific local conditions. Protection against these dangers and risks must be included in the local operating and safety regulations.

It is necessary to become familiarised with this manual prior to the installation of the blower. Do not carry out these activities before careful studying this direction and understanding all the instructions included.

**Read this manual carefully prior to using the blower and in the case of any uncertainty contact the KUBÍČEK VHS, s.r.o. company or an authorised service agent.**

## 1.2 GRAPHIC MARKING OF INSTRUCTIONS

Very important instructions and warnings in this direction for use are marked in the following manner:

**Non-observance of these instructions could cause risk to persons or to property.**

**Forbidden activities.**

**Non-observance of these instructions could cause damage to the equipment.**

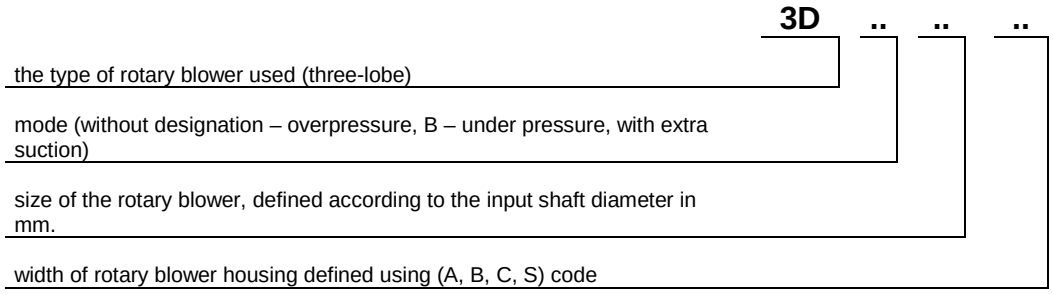
**Other important instructions.**

## 1.3 AMENDMENTS TO THE MANUAL

Any amendment to this manual may be made only by KUBÍČEK VHS, s.r.o. or based on the written consent of the company.

# 2 TYPE IDENTIFICATION OF BLOWERS

The individual types, variants and sizes of the unit are designated using a code according to the following chart:


3D .. .. ..
the type of rotary blower used (three-lobe)
mode (without designation – overpressure, B – under pressure, with extra suction)
size of the rotary blower, defined according to the input shaft diameter in mm.
width of rotary blower housing defined using (A, B, C, S) code

# 3 SAFETY INSTRUCTIONS

## 3.1 REQUIREMENTS FOR QUALIFICATION OF PERSONNEL (COMPANIES)

### 3.1.1 General

To adequately ensure personal safety and the subsequent trouble-free operation of the blower, individual activities related to the assembly and the subsequent usage of the blower must be carried out only by persons (companies) with the relevant expertise.

- **For the assurance of security it is important to ensure that individual functions are executed by**

  **persons (companies) with the requisite competences.**

### 3.1.2 Installation

Installation of the uncompleted machinery can be carried out only by persons who fulfil the following requirements:

- relevant professional qualifications for the installation of machinery
- relevant experience with the installation of machinery
- familiarity with this direction for use.

**Installation can be ordered from the KUBÍČEK VHS, s.r.o. company or from an authorised service representative.**

### 3.1.3 Maintenance and Troubleshooting

Only persons complying with the following requirements are allowed to service and troubleshoot the unit in the extent specified in section 11 of this direction:

- physical and mental qualification to carry out the specified activities
- proven familiarity with this manual
- familiarity with generally valid and local operating and safety regulations
- authorized by the keeper of the unit for these activities.

### 3.2 SAFE INSTALLATION PRINCIPLES

- **prior to the installation of the blower, familiarise yourself thoroughly with the contents of this manual**
- **Cary out only those activities, to which you are authorized by your superior.**
- **When installing the unit, observe generally valid and local operating and safety regulations.**
- **Use generally valid safety procedures only.**
- **Always use the prescribed personal protective equipment.**

### 3.3 PERSONAL PROTECTION EQUIPMENT

Utilisation of personal protective equipment must be as defined by local operational and safety regulations. The anticipated range of personal protective equipment to be utilised is defined in the following table:

Installation of the blower:

| Danger | Protected part | Protective equipment |
|---|---|---|
| scratching, bumping | upper limbs | protective gloves |

Maintenance of the blower:

| Danger | Protected part | Protective equipment |
|---|---|---|
| burns from hot surfaces | upper limbs | protective gloves |

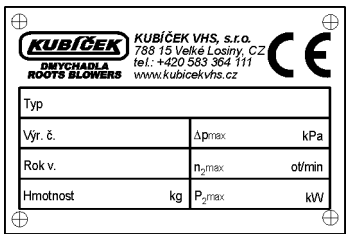
### 3.4 MARKING

#### 3.4.1 General

The blower is equipped with identification marking (rating plates) and safety marking.

**Keep these markings legible and restore them if damaged.**

#### 3.4.2 Name Plates

<table>
<tr>
<td> 
</td>
<td>Name plate sized 45 x 30 mm<br>placed on the blower housing<br>3D..19.., 3D..28..,</td>
</tr>
<tr>
<td>
</td>
<td>Name plate sized 75 x 30 mm<br>placed on the blower housing<br>3D..38.., 3D..45.., 3D..55..,<br>3D..60.., 3D..80.., 3D..90..,<br>3D..100..,</td>
</tr>
</table>

#### 3.4.3 Safety symbols

| Symbol | Meaning |
|---|---|
| | marking of suspension (lifting eye, holes) |

### 3.4.4 Other symbols

| Symbol | Meaning |
|---|---|
| ⇨ | sense of rotation of blower rotor |

### 3.5 PROHIBITED USE

- **do not use the blower to transporting of combustible and/or explosive gases**
- **do not use the blower to transport of mixtures of air and combustible substances**
- **never use the blower in premises with potential presence of air and combustible substances on the suction side**
- **never use the blower when connected to piping, air reservoir (air chamber) etc. with overpressure below the maximum permissible operating pressure of the unit**
- **never use the blower when connected to a reservoir without its own protection against excess over the max. operating pressure**

### 3.6 REGULATIONS AND STANDARDS

#### 3.6.1 Engineering Regulations and Standards

The blower has been designed and manufactured in accordance with the following standards and regulations:

- Decree of the Government No. 176/2008 Coll., laying down technical requirements of machinery (corresponding with the directive 2006/42/EC)
- ČSN EN 1012-1 Compressors and vacuum pumps – Safety requirements. Part 1: Compressors
- ČSN EN 1012-2 Compressors and vacuum pumps – Safety requirements. Part 1: Vacuum pumps

#### 3.6.2 Operating Regulations and Standards

The manufacturer of the final unit is required to prepare a manual for the final unit in the extent required by the Directive 2006/42/EC. During operation of the final unit it is necessary to comply with this manual and with all the regulations and standards applicable in the country of the operator of the final unit, in particular in regard to:

- work safety
- operation of machineries
- operation of electric equipment.

## 4 USE

The blower is designed for the transportation and compression of air or of other non-aggressive, non-combustible and non-explosive gases without mechanical additives. Any use for gases other than air must be discussed with the manufacturer.
The blower must be operated under conditions stated in section 7 without exceeding maximum values stated on the blower name plate. The quantity of medium corresponds to the blower speed and back-pressure in the discharge piping (for overpressure see the catalogue). The air quantity can be controlled only by changing the speed of the blower – electric motor. Throttle regulation of suction or discharge is impermissible!

# 5 DESCRIPTION AND FUNCTION

## 5.1 GENERAL

These are blowers that operate in overpressure and under-pressure modes.

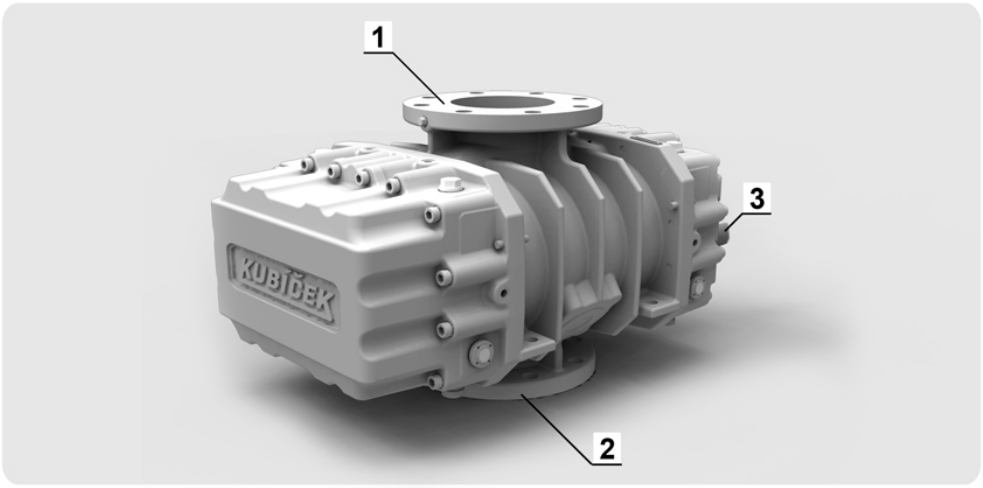
## 5.2 ROTARY BLOWER

The blower serves as an overpressure (under-pressure) source. This is a Roots blower with three-lobe rotary pistons (rotors). The shafts of rotary pistons are placed in rolling bearings and the mutual positions of rotors are controlled by gearing. The bearings and gearings are lubricated with oil. The working area of pistons is not lubricated. The suction and discharge flange of the blower is connected to the suction and discharge part of the blower unit, the input shaft to the drive unit.

**1) suction flange**

**2) discharge flange**

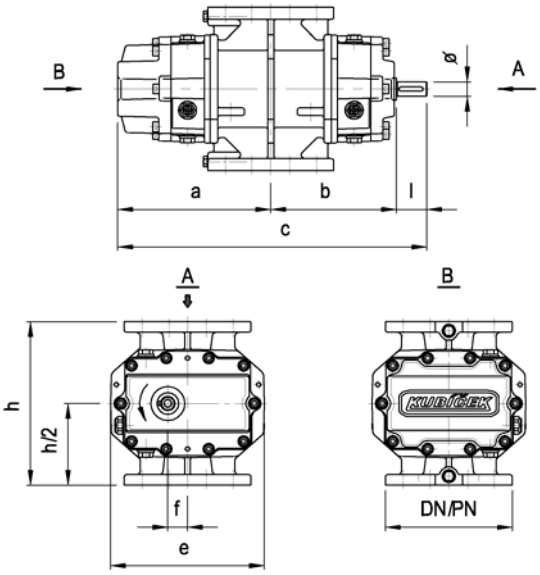
**3) input shaft**




# 6 TECHNICAL SPECIFICATIONS

## 6.1 BASIC DIMENSIONS AND WEIGHT

| type | DN/PN | a | b | c | e | f | h | Ø | l | m |
|---|---|---|---|---|---|---|---|---|---|---|
| | mm | | | | | | | | | kg |
| **3D19S** | 50/16 | 162 | 126 | 328 | 203 | 26 | 216 | 19 | 40 | 28 |
| **3D19A** | 50/16 | 172 | 136 | 348 | 203 | 26 | 216 | 19 | 40 | 34 |
| **3D19B** | 50/16 | 182 | 146 | 368 | 203 | 26 | 216 | 19 | 40 | 36 |
| **3D19C** | 50/16 | 202 | 166 | 408 | 203 | 26 | 216 | 19 | 40 | 40 |
| **3D28A** | 50/16 | 214 | 151 | 435 | 258 | 34 | 264 | 28 | 70 | 62 |
| **3D28B** | 80/16 | 236 | 172 | 478 | 258 | 34 | 264 | 28 | 70 | 69 |
| **3D28C** | 80/16 | 276 | 214 | 560 | 258 | 34 | 264 | 28 | 70 | 80 |
| **3D38B** | 100/16 | 272 | 204 | 561 | 297 | 42.6 | 320 | 38 | 85 | 109 |
| **3D38C** | 100/16 | 322 | 254 | 661 | 297 | 42.6 | 320 | 38 | 85 | 125 |
| **3D45B** | 150/16 | 320 | 239 | 664 | 360 | 53.3 | 360 | 45 | 105 | 164 |
| **3D45C** | 150/16 | 376 | 295 | 776 | 360 | 53.3 | 360 | 45 | 105 | 193 |
| **3D55B** | 150/16 | 375 | 282 | 757 | 430 | 67.5 | 400 | 55 | 100 | 270 |
| **3D55C** | 200/10 | 445 | 352 | 897 | 430 | 67.5 | 400 | 55 | 100 | 325 |
| **3D60B** | 200/10 | 455 | 336 | 941 | 534 | 84 | 500 | 60 | 150 | 480 |
| **3D60C** | 250/10 | 543 | 425 | 1118 | 534 | 84 | 500 | 60 | 150 | 550 |
| **3D80B** | 250/10 | 523 | 405 | 1108 | 652 | 106 | 630 | 80 | 180 | 755 |
| **3D80C** | 300/10 | 638 | 520 | 1338 | 652 | 106 | 630 | 80 | 180 | 980 |
| **3D90B** | 300/10 | 640 | 510 | 1375 | 770 | 135 | 630 | 90 | 225 | 1242 |
| **3D90C** | 400/10 | 793 | 664 | 1682 | 770 | 135 | 630 | 90 | 225 | 1575 |
| **3D100B** | 400/10 | 782 | 702 | 1709 | 1000 | 167.5 | 800 | 100 | 225 | 2150 |
| **3D100C** | 500/10 | 917 | 837 | 1979 | 1000 | 167.5 | 1000 | 100 | 225 | 2605 |



### 6.2 TECHNICAL SPECIFICATIONS

Basic technical specifications of blowers are available at www.kubicekvhs.cz, on the name plate and in purchase contract.

**Never use the blower at speeds ($n_{2max}$) and pressure difference ($\Delta p_{max}$) exceeding the value stated on blower name plate.**

**Use the blower within the parameters set by the purchase contract only.**

**The catalogue value of the volumetric flow Q must be in the range of**

- **±10% for blowers 3D..19..**
- **±7% for blowers 3D..28.., 3D..38.., 3D..45.., 3D..55.., 3D..60..**
- **±5% for blowers 3D..80.., 3D..90.., 3D..100..**

# 7 INSTALLATION CONDITIONS

### 7.1 GENERAL

To ensure proper installation and reliability of the blower on long-term basis, the following conditions, as described below must be followed with regard to:

- ambient conditions
- position of the blower
- vibration
- suction part
- discharge part
- drive unit

### 7.2 CONDITIONS OF THE ENVIRONMENT

The blower can be operated only within a defined environment.

| | |
|---|---|
| Environment classification according to ČSN EN 60 721-3-3 | 3K3, 3Z1,3B1, 3S1 |
| Environment classification according to ČSN EN 60 079-10 | no danger |
| Temperature | (-20 - + 40)°C |
| Relative humidity | (30 to 80) % |
| Sea-level altitude | max. 1000 m asl |

### 7.3 POSITION OF THE BLOWER

The blower must be installed:

- with the discharge flange on top
- in a level position; unevenness max. 1mm/1m

### 7.4 VIBRATIONS

Facilities intended for blower installation must possess sufficient rigidity. Vibration of the operating equipment must not exceed the following limits:

| **electric power** | **up to 15 kW** | **(15 – 75) kW** | **above 75 kW** |
|---|---|---|---|
| **vibration capacity speed (mm/s)** | 7.10 | 11.2 | 18.0 |

## 7.5 SUCTION PART

### 7.5.1 Filtration

The air intake by the blower must not contain oversize particles. For this reason, a filtration system must be installed on the side of the suction flange. For proper operation of the blower it is recommended to use the filter class in accordance with EN 779 G3. The pressure drop on new (clean) filtration shall not exceed 2kPa. During operation, it is recommended to clean or replace the filter in the event of a pressure drop exceeding 5kPa.

### 7.5.2 Air Intake

Installation of the blower as part of the final equipment must not restrict the airflow. The temperature of the input air should not exceed 40°C.

**The blower must not be used in environments in which the possibility is not excluded of drawing a combination of air and combustible substances into the suction side.**

## 7.6 DISCHARGE PART

### 7.6.1 Check Valve

If it is essential to prevent the backflow of air from the piping connected through the blower to the discharge when the device is idle or after it has been shut down; a check valve can be installed behind the discharge section. Backflow may occur in the following situations:

- multiple blowers connected into a single piping system
- the connected piping impossible to de-pressurize

### 7.6.2 Relief Valve

Each blower must be protected with a relief valve from exceeding the maximum permissible working pressure. When the pressure is exceeded (e.g. after the connected discharge piping is closed), the valve opens and air can escape into the atmosphere.

**The relief valve designed to protect the blower must not, at the same time, serve as a protection against exceeding the maximum allowable working pressure in the parts connected to the blower.**

### 7.6.3 Combined Relief and Start-up Valve

The relief valve can be replaced with a combination relief and start-up valve. This valve also serves as safety valve (see 7.6.2) and makes starting of the unit possible when there is permanent pressure in the connected piping (i.e. start to back-pressure) at the same time . The valve permits the initial start-up of the blower with release into the open atmosphere (thereby specifically protecting the motor against initial overload caused by back pressure).

**The combined relief and start-up valve, designed to protect the blower, must not at the same time serve as the protection against exceeding the maximum allowable working pressure in the parts that are connected to the blower.**

### 7.6.4 Discharge Silencer

It is appropriate to install the pipe silencer behind the discharge section of the blower. This reduces noise in the final equipment and, in addition, volume pulsations in the pipeline.

## 7.7 POWER UNIT

The power unit providing the power for the blower is recommended to be assembled with the electric motor and the belt gear. The design of electric motor mounting should prevent overloading the bearings by radial and axial forces.

### 7.8 PIPING CONNECTION

When designing the pipeline connected to the blower it is necessary to observe the following principles:

- the diameter of the pipe should not be smaller than the diameter of the outlet / inlet device (ØD/DN)
- when designing the piping it is necessary to take into account the air temperature $t_2$ with regard to the material used
  and its dilation
- the piping at the location designated for the connection of the blower must terminate with a flange corresponding to the flange
  on the blower
- connected pipes must be anchored properly in order to withstand the static and dynamic load of the installed
  blower

# 8 HANDLING, TRANSPORT AND STORAGE

### 8.1 DELIVERY CONTENTS

The delivery includes:

- the blower
- this user manual

All parts of the consignment are placed on a common shipping pallet.

### 8.2 HANDLING

#### 8.2.1 General

The blower can be handled using a stacking or a forklift truck or a crane. The unit is attached to the shipping pallet using nails or wood screws. Before removing the unit from the pallet, remove the shipping container and the pallet anchoring.

#### 8.2.2 Stacking or Forklift Trucks

The pallet can be handled in a way common for handling of pallets. When handling the actual blower, without the pallet, it is prohibited to do so with a stacking or forklift truck.

**Be careful when handling the unit as it is not balanced and can therefore tip over.**

#### 8.2.3 Crane

For handling the blower, when using a crane (i.e. suspension), it is recommended to attach lifting eyes to the flange of the blower (the suction flange) using bolts. Also, with regard to occupational safety, there are other possible methods of suspension.

- **When handling, observe generally valid and local safety regulations applicable to the use of crane.**
- **Do not lash the blower by its input shaft**
- **The blower may be handled in a horizontal position only (with the discharge flange downwards)**

### 8.3 TRANSPORT

The unit can be transported in a covered cargo space, using common means of land or air transport. Always use a shipping pallet for delivering the blower to the loading area, and lock the air blower to prevent its movement.

**Never lay the blower on its side. The blower may be placed or handled in a horizontal position only (with the pallet underneath it).**

### 8.4 STORAGE

On a short-term basis, the blower can be stored in a closed area protected from the direct effects of weather. For long-term storage (more than 1 month), it is necessary to store the unit in a closed dry area with permanent temperature, humidity and suitable class of climatic conditions 1K2 according to ČSN EN 60 721-3-1.
If the storage of the blower is to last for longer than one year, we recommend the protection of the compression area of the blower with suitable preservatives, based on preservative oils. Treat surfaces of the other parts of the blower with suitable anti-corrosion agents.

# 9 INSTALLATION AND COMMISSIONING

### 9.1 GENERAL

The installation of the blower includes:

- transportation of the blower to the location for its installation
- incorporation in the final device
- oil charge check
- first start
- test run under testing conditions (pressure, speed, verification of functions of safety elements).

### 9.2 TRANSPORT TO PLACE OF INSTALLATION

During transportation the handling instructions defined in Section 8.3. must be observed

### 9.3 INCORPORATION IN THE FINAL DEVICE

Installation should be carried out in the following manner:

- Align the discharge flange of the blower with the flange of the discharge piping (any other means of attachment of the blower
  must be consulted with the manufacturer)
- Fasten the blower to the piping using screws
- Align the suction section of the blower with the piping for the air intake and fasten it using screws
- Check that the blower is mounted horizontally on the device (max. deviation 1mm per 1m)

Dimensions of the fastening screws

| type | DN/PN | number of | strength of | thread | torque |
|---|---|---|---|---|---|
| **3D16C** | 32/16 | 4 | 8.8 | M16 | 156 Nm |
| **3D19A** | 50/16 | 4 | 8.8 | M16 | 156 Nm |
| **3D19B** | 50/16 | 4 | 8.8 | M16 | 156 Nm |
| **3D19C** | 50/16 | 4 | 8.8 | M16 | 156 Nm |
| **3D28A** | 50/16 | 4 | 8.8 | M16 | 156 Nm |
| **3D28B** | 80/16 | 8 | 8.8 | M16 | 156 Nm |
| **3D28C** | 80/16 | 8 | 8.8 | M16 | 156 Nm |
| **3D38B** | 100/16 | 8 | 8.8 | M16 | 156 Nm |
| **3D38C** | 100/16 | 8 | 8.8 | M16 | 156 Nm |
| **3D45B** | 150/16 | 8 | 8.8 | M20 | 156 Nm |
| **3D45C** | 150/16 | 8 | 8.8 | M20 | 314 Nm |
| **3D55B** | 150/16 | 8 | 8.8 | M20 | 314 Nm |
| **3D55C** | 200/10 | 8 | 8.8 | M20 | 314 Nm |
| **3D60B** | 200/10 | 8 | 8.8 | M20 | 314 Nm |
| **3D60C** | 250/10 | 12 | 8.8 | M20 | 314 Nm |
| **3D80B** | 250/10 | 12 | 8.8 | M20 | 314 Nm |
| **3D80C** | 300/10 | 12 | 8.8 | M20 | 314 Nm |
| **3D90B** | 300/10 | 12 | 8.8 | M20 | 314 Nm |
| **3D90C** | 300/10 | 12 | 8.8 | M20 | 314 Nm |
| **3D100B** | 400/10 | 16 | 8.8 | M24 | 549 Nm |
| **3D100C** | 500/10 | 20 | 8.8 | M24 | 549 Nm |

### 9.4 FIRST START-UP

The priority for the first start-up is to check whether the blower has been properly installed and is operable. Before starting the unit, check that:

- there is an appropriate quantity of the oil charge (correct level height) in the rotary blower (see section 10.2)
- All fittings in the connected piping are open.
- Screw connections are checked.

After the checking, turn the unit shortly on and immediately off (within 1 sec.) and during the running-out phase check that the sense of rotation of the driving shaft of the rotary blower corresponds to the arrow on the blower. If it is not the case, the unit is connected incorrectly and it is necessary to change connection of electric wires in the terminal block of the electric motor.

If the sense of rotation corresponds to the arrow on the blower, turn on the unit and check that:

- The unit operation is even (the rotary blower should make a mono sound free of any bangs, the belt gear should run smoothly and free of any vibrations)
- The air does not leak from any parts of the equipment
- The stated maximum levels of vibration for the actual equipment or of the connected piping are not exceeded
- The value on the overpressure gauge corresponds to the nominal pressure difference stated on the name plate of blower

**The testing operation may not commence if the conditions described above are not met.**

# 10 OPERATION PROCEDURE

## 10.1 GENERAL

The blower is designed for long-term full-time operation. Its operation henceforth includes only operational checks.

## 10.2 OPERATING CHECKS

When the blower is permanently in operation as a component of the final device, check at least once daily that:

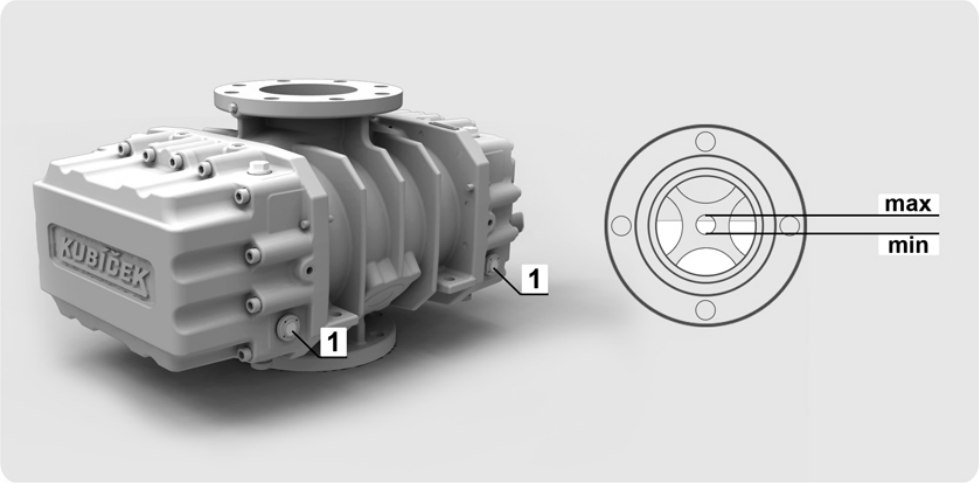
- The unit operation is even (the rotary blower should make a mono sound free of any bangs, the belt gear should run smoothly and free of any vibrations)
- There are no vibrations on the unit or the connected piping.
- There is no visible oil leak from the blower.
- The data on under-pressure gauge (suction) and the value shown on overpressure gauge (discharge) comply with technical specification of the contract (it is recommended to highlight the relevant gauge value, e.g. using a red marking pen).

  In the case of a unit with speed control, it is requisite to read the value at the nominal speed.
- No unusual behaviour occurs that did not occur during previous checks.

Apart from the daily checking described above, the unit must be checked daily for potential drop of oil charge below the minimum level. When checking, proceed in the following way:

- Turn off the unit.
- wait for approx. 1 minute (time required for oil level stabilisation) and check, whether the oil level is visible through both oil gauges and located between minimum and maximum limits. The minimum and maximum are determined by the top and bottom edges of the circular aperture in oil gauge mirror.

1) Oil Gauge




- **It is not permissible to operate the equipment if the above-mentioned conditions are not met.**
- **Turn off the unit and contact your superior.**

# 11 MAINTENANCE AND REPAIRS

## 11.1 GENERAL

Maintenance of the blower consists only of checking, exchanging or refilling of the oil charge.

## 11.2 MAINTENANCE PLAN

The maintenance plan is specified in the following table:

| Interval | | | | Activity | Procedure |
|---|---|---|---|---|---|
| **Month** | **3 months** | **Year** | **Other** | | |
| x | | | general inspection | checking the blower | see 11.3.3 |
| x | | | | oil charge check | see 11.3.4 |
| | | x | after the first 500 hours of operation, subsequently in accordance with the operating conditions | oil charge replacement | see 11.3.4 |

**Oil change interval depending on operating conditions:**

1. **The first oil change after 500 hours of operation**
2. **The second oil change during warranty period and further changes after every 2 000 hours (i.e. 3 months of continuous operation). Any failure to comply with such interval will result in reduction or restriction of the blower warranty.**

   **If the blower does not complete 2 000 hours of operation within a specific year, the oil change will be performed 1x a year.**
3. **The manufacturer recommends oil change in the maximum interval of 3 000 hours after the expiry of warranty (i.e. 4 months of continuous operation). If the blower does not complete 3 000 hours of operation within a specific year, the oil change will be performed 1x a year.**

   **Every oil change will be followed by replacement of gaskets under inlet and discharge caps. Blower series 3D38 and above require replacement of gaskets under inlet caps only.**

## 11.3 MAINTENANCE PROCEDURES

### 11.3.1 General Principles

During the maintenance works, proceed in the following way:

- Do the maintenance activities in accordance with the maintenance plan and procedures specified below.
- If the procedures are not specified in detail, use common procedures used for maintenance of machinery and units.

### 11.3.2 Safety

During the maintenance works, observe instructions given in section 3, use common safety procedures (before starting the maintenance e.g. turn off or disconnect the electrical equipment) and the below mentioned maintenance instructions and procedures.

### 11.3.3 General Check

Check the general condition of the unit, especially that:

- The unit operation is even (the rotary blower should make a mono sound free of any bangs, the belt gear should run smoothly and free of any vibrations)
- The air does not leak from any parts of the equipment
- There are no vibrations on the unit itself or the connected piping.
- No screw joints are loosened
- The value on the overpressure manometer corresponds to the nominal pressure difference $\Delta p$ specified on the blower

- The oil does not leak from the rotary blower.
- The surface temperature of the rotary blower does not exceed 130°C

**If the above-described conditions are not complied with, contact the KUBÍČEK VHS, s.r.o. company or another authorised service organisation.**

### 11.3.4 Oil Charge for Rotary Blower

The rotary blower is equipped with two individual oil charges. The volume of the charges and their type are specified in the table below. The blowers are filled with fully synthetic oil SAE 5W/40 (DYNAMIC PRIMA 5W/40) as standard. When changing the oil use the same type or an equivalent type of oil.

Each of the individual oil charges is equipped with an oil gauge and a fill and a drain opening and is closed with plugs. For 3D38 and larger types the drain openings are equipped with plugs with a drain valve and a drain hose with a hose screw joint.

**Oil Level Check**

Turn off the unit (time to stabilize the oil level is about 1 minute) and check that the oil level is in the specified range. (the minimum and maximum level is defined by the lower and upper edges of the circular hole in the oil gauge mirror). If that is not the case, refill or drain the oil.

The oil level may not drop below the defined minimum because this would create a risk of reduced lubrication and consequent damage to the blower. If the oil level is over the defined maximum, the oil can leak from the blower through de-aerating holes and get into the compression space of the blower.

| Type of blower unit | Total quantity of oil charge | Recommended oil types |
|---|---|---|
| 3D19 | about 045 l | Dynamic PRIMA (5W/40) and its equivalents ACEA C3-04, ACEA A3/B4-04, APISM/CF, MB229.31, BMW Longlife-04, VW 502 00/505 00, VW 505 01, Porsche GL |
| 3D28 | approx. 0.7 l | |
| 3D38 | approx. 1.0 l | |
| 3D45 | approx. 1.3 l | |
| 3D55 | approx. 2.4 l | |
| 3D60 | approx. 4.3 l | |
| 3D80 | approx. 9.0 l | |
| 3D90 | approx. 11.5 l | |
| 3D100 | approx. 18 l | |

**Specification of equivalent oils**

| | |
|---|---|
| Oil type synthetic motor oil | |
| Viscosity class | SAE 5W-40 |
| Performance levels, approval | ACEA C3-04, ACEA A3/B4-04, APISM/CF, MB229.31, BMW Longlifwe-04, VW 502 00/505 00, VW 505 01, Porsche GL |
| Kinematic viscosity at $100^0$C ($mm^2/s$) | 14.5 |
| Kinematic viscosity at $40^0$C ($mm^2/s$) | 87.9 |
| Density at $15^0$C ($g/cm^3$) | 0.851 |
| Solidification point ($^0$C) | -42 |

**Oil Change**

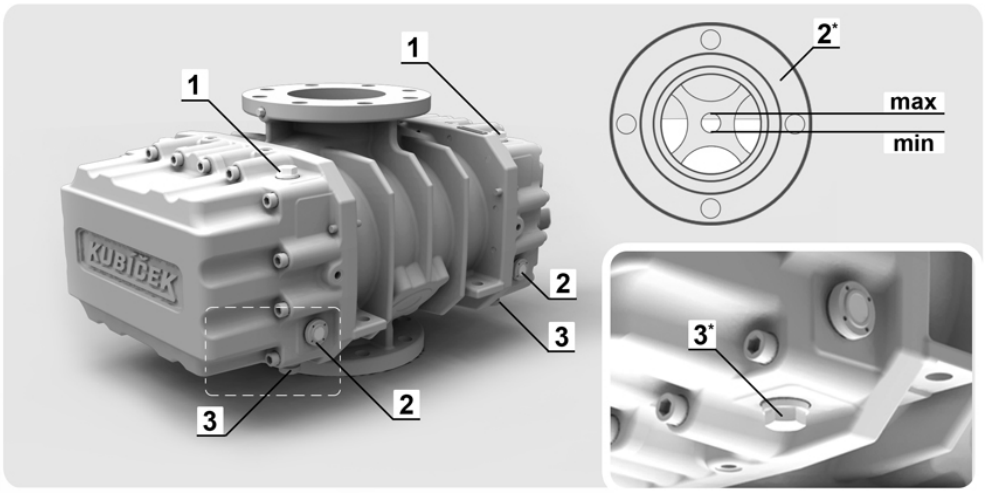
When replacing, proceed in the following way:

- Turn off the unit.
- Unscrew the fill plug.

- For types 3D..19.., 3D..28.. unscrew the drain plug and drain the oil
- For types 3D..38.., 3D..45.., 3D..55.., 3D..60.., 3D..80.., 3D..90.., 3D..100.., fitted with plugs and drain valves , unscrew the lid, connect the drain union hose and drain the oil. (After the cap nut of the drain hose has been connected and screwed on, the plug valve will open.)
- For types 3D..19.., 3D..28.. screw on and tighten the drain plug (remember to check the sealing)
- For types 3D..38.., 3D..45.., 3D..55.., 3D..60.., 3D..80.., 3D..90.., 3D..100.., disconnect the drain hose with screw coupling, fir the lid and tighten it lightly.
- Refill the oil slowly through the fill hole until the oil level in the oil gauge reaches approx. the minimum of the defined range.
- wait for approx. 2 min., check the oil level and refill the oil if need so that the oil level in the oil gauge is in the specified range.
- Check the drain plug for leakage.
- Screw on and tighten the fill plug.

- **Always change both oil charges.**
- **It is inadmissible to fill the blower with the oil under the minimum level of the defined range in the oil gauge.**
- **Always fill the blower with the oil so that the oil level is in the oil gauge in the defined range.**

1) fill plug
2) oil gauge
3) fill plug




Dispose of the used oil in accordance with the valid legal regulations.

### 11.4 FAILURES AND TROUBLESHOOTING

#### 11.4.1 Summary of Failures

Failures of the blower may be remedied only by KUBÍČEK VHS or by another authorised person.
The user may perform these activities only if agreed by the manufacturer.

### 11.5 SPARE PARTS

#### 11.5.1 General

Spare parts are supplied only to authorised persons, unless the Contract states otherwise.

## 12 SERVICING

Where necessary, servicing can be ordered from the KUBÍČEK VHS, s.r.o. company or from another authorised service organisation. When ordering, always specify the type and serial number of the unit. The service is always recorded in the Service book.

# 13 DISASSEMBLY AND DISPOSAL

There are no special removal and disposal procedures. Use common procedures used for removal and disposal of machines and units.

# 14 CONDITIONS FOR ACCEPTANCE OF REPAIRS UNDER WARRANTY

## 1. The claimant must prove

a) the implementation of checks in accordance with the maintenance plan and at the intervals specified.

## 2. Defect origin assessment – The guarantee does not apply to defects caused by:

a) Natural disaster.
b) Local breakdown.
c) Suction of air with inadequate quantity of solid particles.
d) Machine flooding due to back pressure of liquid.
e) Defect of another product.
f) Improper installation into the final unit.

## 3. Claims for repairs under warranty will be void should any of the following provisions have been infringed:

a) The equipment that is the subject of the claim may be dismantled only by the manufacturer or another authorised person.
The user may dismantle the device with consent of its manufacturer only.
b) The equipment may be operated only in accordance with the parameters specified in the purchase contract or according to other
parameters that have been approved by the manufacturer in writing.
c) The unit may be operated only in environment specified in this manual.

## 4. Warranty Period

The length of the warranty period is defined in the purchase contract.

**Notes:**

**Notes:**